NISTTech

Particle Calorimeter with Normal Metal Base Layer

Abstract

A detector of X-ray and the like in which very good resolution of energy can be obtained. The device is based on two basic components. The first is the x-ray absorber in which an x-ray interacts with a film and converts its energy into heat. Because the absorber is operated at cryogenic temperatures, approximately the range of 0.01 Kelvin to 1 Kelvin, its heat capacity is small and causes a measurable temperature rise. The second component of the invention is a base layer of normal metal which absorbs the heat generated by the x-ray. The third component of the invention is the method to detect the temperature rise. This thermometer is based on a normal metal-insulator-superconductor tunnel junction, where part of the base layer is the normal metal. When the tunnel junction is electrically biased at a voltage slightly below the gap voltage of the superconductor, the electrical current that flows through the junction is sensitively dependent on the temperature of the normal metal.

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Citations

1. Please see two additional microcalorimeters:
2. Docket # 97-040 Superconducting Transition-Edge Sensor with Weak Links
3. Docket # 99-035 Normal Metal Boundary Conditions for Multi-layer TES Detectors

References

- Expired U.S. Patent # 5,634,718 issued 06-03-1997
- Docket: 94-005US

Status of Availability

This technology is available in the public domain.

Last Modified: 02/11/2011